

ABSTRACT OF THE DISCLOSURE:

An apparatus for sectioning fresh unfixed tissue into very thin layers with preserved tissue architecture, antigenicity, mRNA content, and amenable to 3-D computer reconstruction. An electro-discharge machine (EDM) to accurately slice tissues through electro-dissociation of the tissue without mechanical or thermal damage. The tissue sample is placed on a holder submerged in a cooling bath comprising a liquid such as saline or water to minimize thermal effects and to provide a sink for dissociated ions. A cutting tool is electrically biased with respect to the tissue sample. A computer controlled EDM machine with x-y-z translation stage slices the tissue as defined by a predetermined program. The liquid in the cooling bath may be cooled to minimize tissue heating during cutting. In a preferred embodiment, the cutting tool may use focused RF energy to produce consecutive thin sections of fresh tissue for immunohistochemical and nucleic acids analyses by electro-dissociation without mechanical or thermal damage, ultimately allowing high-resolution volumetric reconstruction of gene and protein expression patterns of large tissue specimens.